ETAD

47-PP CONTAINS NO CBI

Ecological and Toxicological Association of the Dyestuffs Manufacturing Industry

U.S. OPERATING COMMITTEE OF ETAD

88920085510

September 17, 1992

8EHQ-92-6864
INIT

Document Processing Center
TS-790
Room 105, East Tower
Office of Toxic Substances
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

RE: TSCA Section 8(e) Report

Ecological Effects of Dyes

ATTN: TSCA Section 8(e) Coordinator

The U.S. Dye Manufacturers Operating Committee of ETAD submits the enclosed information as a Section 8(e) report in accordance with procedures under the Toxic Substances Control Act. This submission contains no confidential business information.

ETAD is an international technical organization formed by the dyes manufacturing industry to address health and environmental safety issues pertaining to organic colorants. The eleven U.S. members of ETAD are BASF Corporation, Carey Industries, Ciba-Geigy Corporation, Crompton & Knowles Corporation, Fabricolor Inc., Hoechst Celanese Corporation, ICI, Miles, Inc., Morton International, Sandoz Chemicals Corporation, and Sunbelt Corporation. These companies represent the majority of the dye manufacturing capacity in the U.S.

Under an ETAD project titled, Environmental Assessment of Dyestuffs, 47 major dyes were evaluated in a battery of ecotoxicity tests that included Zebra fish, Daphnia magna, Alga, and Bacteria. As the results indicate, the majority of the dyes do not exhibit significant ecotoxicity in any of the four organisms. Moreover, ETAD does not have any information about whether any of the dyes are widespread in environmental media. However, although ETAD has not performed a comprehensive survey of production of the 47 tested dyes, ETAD is submitting these data under Section 8(e) because the following three dyes are believed to be produced in the United States at relatively high volumes and exhibited ecotoxicity in one or more of the organisms at a concentration of less than 1.0 mg/l:

Leuco Sulphur Black 1	CI 53185
Mordant Black 17	CI 15705
Basic Blue 3	CI 51004

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A report of this project and summary tables of the data are enclosed with this letter.

Please contact me immediately at 202-659-0060 if there are any questions in connection with this submission.

Sincerely,

C. Tucker Helmes, Ph.D.
Executive Director

Enclosure

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ETAD PROJECT E3020
DATA SUMMARY - (ACID DYES)

Dyestuff	CI Constitution Number	Log $P_{o/w}$	Water Solubility (g/l)	ZEBRA FISH 96 hr LC_{50} (mg/l)	DAPHNIA MAGNA 48 hr EC_{50} (mg/l)	SCENEDESMUS SUBSPICATUS 72 hr EC_{50} (mg/l)		Bacteria IC_{50} (mg/l)	ZAHN-WELLENS COLOUR REMOVAL		REMARKS
						Biomass	Growth		3 hr (%)	28 days (%)	
Acid Blue 40	62125	-	10	>500	100	0.33	0.35	>100	47	-	
Acid Orange 156	26501	-	18	220	24	[illegible]	37	>100	-	36	
Acid Blue 80	61585	-	17	120	140	0.29	0.24	>100	-	10	
Acid Black 52	15711	-	18	2.1	54	2.7	3.5	125	71	-	
Acid Yellow 99	13900	-	6	375	>0.2	>0.22	>0.22	>100	48	90	Sparingly soluble
Acid Yellow 151	13906	-	14	42	55	13	32	>100	36	63	
Acid Yellow 219	-	-	>100	37	>10	>10	>10	>100	59	94	Sparingly soluble
Acid Black 1	20470	-	>2	490	119	11	30	>100	4	15	
Acid Orange 3	10385	-	>2	10	22	10	18	>100	9	12	
Acid Blue 25	62055	-	>2	42	83	3.6	5.6	>100	40	77	
Acid Red 1	18050	-	>2	>560	>500	>100	>100	>100	2	7	

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ETAD PROJECT E3020
DATA SUMMARY - (DISPERSE DYES)

Dyestuff	CI Constitution Number	Log $P_{o/w}$	Water Solubility (g/l)	ZEBRA FISH 96 hr LC_{50} (mg/l)	DAPHNIA MAGNA 48 hr EC_{50} (mg/l)	SCENEDESMUS SUBSPICATUS 72 hr EC_{50} (mg/l)		Bacteria IC_{50} (mg/l)	ZAHN-WELLENS COLOUR REMOVAL		REMARKS
						Biomass	Growth		3 hr (%)	28 days (%)	
Disperse Violet 26	62025	5.1*	Insoluble	>500	>200	>10	>10	>100	20	7	) Log $P_{o/w}$) by HPLC
Disperse Yellow 58	56245	5.8/4.4*[2]	Insoluble	17	>200	>10	>10	>100	0	0	
Disperse Red 73	11116	3.5*	Insoluble	17	23	>10	>10	>100	0	0	
Disperse Blue 73	63265	3.4	2×10^4	>500	200	1.0	0.032	>100	-	-	) Considered not suitable for Zahn-Wellens Study
Disperse Blue 79	11345	4.3	2×10^5	340	4.5	15	9.5	>100	-	-	
Disperse Orange 30	11119	4.2	7×10^5	710	5.8	3.4	6.7	>100	-	-	
Disperse Yellow 42	10338	3.8	3×10^5	>500	110	1.1	1.5	>100	-	-	
Disperse Blue 60	61104	4.1	2×10^5	>200	>0.8*	0.4	>0.8	>100	8	75	* Highest Concentration tested
Disperse Blue 56	63285	1.6	<2	122	550	1.9	12	>100	2/90[1]	10/42[1]	
Disperse Orange 25	11227	>3.5*	<2	268	110	17	54	>100	6/88[1]	4/41[1]	* Too insoluble in water for log $P_{o/w}$ determination
Disperse Red 17	11210	3.8	<2	103	98	0.6	7	>100	1/79[1]	12/57[1]	

NOTE[1] Results on mixed/settled samples.
[2] Log $P_{o/w}$ for Disperse Yellow 58 : 2 Homologues present

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ETAD PROJECT E3020
DATA SUMMARY - (DIRECT DYES)

Dyestuff	CI Constitution Number	Log $P_{o/w}$	Water Solubility (g/l)	ZEBRA FISH 96 hr LC_{50} (mg/l)	DAPHNIA MAGNA 48 hr EC_{50} (mg/l)	SCENEDESMUS SUBSPICATUS 72 hr EC_{50} (mg/l)		Bacteria IC_{50} (mg/l)	ZAHN-WELLENS COLOUR REMOVAL		REMARKS
						Biomass	Growth		3 hr (%)	28 days (%)	
Direct Blue 15	24400	-	30	>500	>500	4.7	6.8	>100	-	18	
Direct Red 81	28160	-	57	>1000	334	26	101	>100	10	100	
Direct Orange 34	40215	-	39	>1000	>1000	345	>1000	>100	52	70	
Direct Black 22[1]	35435	-	46	>1000	871	3.2	16	>100	20	92	
Direct Orange 102	29156	-	-	>500	>500	7.0	>32	>100	15	78	
Direct Orange 39	40215	-	-	>500	>500	>100	>100	>100	4	95	
Direct Black 22[1]	35435	-[2]	<2	>560	>500	41	72	>100	94	97	Sparingly soluble

NOTE[1] Different samples of same dye.

NOTE[2] Too insoluble in octanol and water to carry out.

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ETAD PROJECT E3020
DATA SUMMARY - (HYDROLYSED REACTIVE DYES)

Dyestuff**	CI** Constitution Number	Log $P_{o/w}$	Water Solubility (g/l)	ZEBRA FISH 96 hr LC_{50} (mg/l)	DAPHNIA MAGNA 48 hr EC_{50} (mg/l)	SCENEDESMUS SUBSPICATUS 72 hr EC_{50} (mg/l)		Bacteria IC_{50} (mg/l)	ZAHN-WELLENS COLOUR REMOVAL		REMARKS
						Biomass	Growth		3 hr (%)	28 days (%)	
Reactive Orange 16	17757	-	>2	>500	>128	>10	>10	>100	0	60	
Reactive Orange 7	17756	-0.6*	1	>500	>128	>10	>10	>100	0	60	* Log $P_{o/w}$ by calculation
Reactive Violet 5	18097	-	>2	>500	>128	>10	>10	>100	0	95	
Reactive Yellow 17	18852	-	>2	>500	>128	>10	>10	>100	0	10	
Reactive Black 5	20505	-	>2	>500	>128	>10	>10	>100	0	72	
Reactive Red 35	-	-	>2	>500	>128	>10	>10	>100	0	96	
Reactive Blue 19	61200	-	>2	337	>128	>10	>10	>100	12	14	
Reactive Orange 13	18270	-	>2	>560	>500	>100	>100	>100	3	5	

** Name and Consitution Number of unhydrolysed reactive dye

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ETAD PROJECT E3020
DATA SUMMARY - (MISCELLANEOUS)

Dyestuff	CI Constitution Number	Log $P_{o/w}$	Water Solubility (g/l)	ZEBRA FISH 96 hr LC_{50} (mg/l)	DAPHNIA MAGNA 48 hr EC_{50} (mg/l)	SCENEDESMUS SUBSPICATUS 72 hr EC_{50} (mg/l)		Bacteria IC_{50} (mg/l)	ZAHN-WELLENS COLOUR REMOVAL		REMARKS
						Biomass	Growth		3 hr (%)	28 days (%)	
Leuco Sulphur Black 1	53185	-	Miscible	210	160	.39	0.36	>100	100	-	
Mordant Black 17	15705	0.11	0.43	112	>7.1*	0.033	0.34	>100	92	100	* Limited solubilit
Mordant Red 94	18841	-0.42	0.24	133	>3.1*	<0.01	0.11	>100	0	67	* Limited solubilit
Mordant Blue 9	14855	-	-	>500	>340	0.83	30	>100	2	55	

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ETAD PROJECT E3020
DATA SUMMARY - (BASIC DYES)

Dyestuff	CI Constitution Number	Log $P_{o/w}$	Water Solubility (g/l)	ZEBRA FISH 96 hr LC_{50} (mg/l)	DAPHNIA MAGNA 48 hr EC_{50} (mg/l)	SCENEDESMUS SUBSPICATUS 72 hr EC_{50} (mg/l)		Bacteria IC_{50} (mg/l)	ZAHN-WELLENS COLOUR REMOVAL		REMARKS
						Biomass	Growth		3 hr (%)	28 days (%)	
Basic Blue 3	51004	-	45	12	0.24	0.03	0.05	46	3	4	
Basic Violet 16 (oxalate)	48014	-	-	10	0.05	1.9	1.4	3	0	30	
Basic Violet 7	48020	-	-	2.4	0.09	2.9	5.3	2	5	62	
Basic Blue 22	61512	-	-	7.5	43	4.4	7.2	>100	0	53	
Basic Yellow 21	48060	-	-	58	0.22	1.8	4.0	17	0	53	
Basic R[illegible]13	48015	-	-	24	0.22	0.43	0.83	6	4	60	

ETAD ECOLOGICAL SUB-COMMITTEE
PROJECT : E3020

ECOLOGICAL ASSESSMENT OF IMPORTANT DYESTUFFS

AIMS:

1 To develop a database on a substantial number of dyes for which the colour index have published the structures

2 To assess the possible implications of the results

ACS 02

1 OVERVIEW OF PRELIMINARY RESULTS

2 IMPLICATIONS FOR THE EEC CLASSIFICATION "DANGEROUS FOR THE ENVIRONMENT"

3 IMPLICATIONS FOR ENVIRONMENTAL HAZARD AND RISK ASSESSMENT

DYESTUFFS TESTED AS TECHNICAL SUBSTANCE (DRY PRESS PASTE) EXCEPT:

1 Reactive dyes
   - e-hydrolysed

2 Disperse dyes
   - tested as a dispersion using a standard (non-toxic) dispersing agent

RESULTS ALL EXPRESSED AS TECHNICAL SUBSTANCE

47 Dyes :	11	Acid
	11	Disperse
	8	Reactive
	7	Direct
	6	Basic
	3	Mordant
	1	Sulphur

ACS CH

STUDIES

1 ZEBRA FISH *(Brachydanio rerio)*

96 hr LC_0 , LC_{50} and LC_{100}

2 *Daphnia magna*

48 hr EC_0 , EC_{50} and EC_{100}

3 ALGA *(Scenedesmus subspicatus)*

72 hr EC_0 , EC_{50} and EC_{100}

4 BACTERIA (activated sludge respiration inhibition)

IC_{20} , IC_{50} and IC_{100}

5 MODIFIED ZAHN-WELLENS

Colour adsorption : 3 hours
Colour removal : 28 days

ACS 05

ENVIRONMENTAL IMPACT OF PRODUCTS

WHAT ARE WE TRYING TO DO?

1 Ensure that substances with potentially dangerous environmental properties are identified (classification)

2 Ensure that the environmental risk posed by those substances is assessed (risk assessment)

3 Ensure that substances which pose a risk are used safely (risk management)

WE : LEGISLATORS AND RESPONSIBLE CHEMICAL INDUSTRY

ACS 06

SIXTH AND RECENTLY ADOPTED SEVENTH AMENDMENTS OF DIRECTIVE 67/548/EEC - CLASSIFICATION, PACKAGING AND LABELLING OF DANGEROUS SUBSTANCES

CS 07

"6TH AMENDMENT" DIRECTIVE (79/831/EEC)

Article 2.2 k

Dangerous for the environment:

substances and preparations the use of which presents or may present immediate or delayed risks for the environment:

CRITERIA FOR CLASSIFICATION
(Commission ground rules)

USE BASE-SET DATA:

Fish, daphnia, (algal) toxicity

Ready biodegradability (abiotic degradation)

Partitioning behaviour (air/water, soil/water, biota/water)

ACS 09

HOW RECONCILE CLASSIFICATION CRITERIA USING SIMPLE BASE-SET DATA WITH:

1 The complexity of the environment and its ecosystems

2 The complexity of use patterns and possible release scenarios for different substances and preparations

NO SCIENTIFICALLY VALID SOLUTION!

PRAGMATIC SOLUTION:

Use available data to make an arbitrary classification predominantly relevant to aquatic organisms.

Use "safety net" phrases to enable other substances to be classified on a case-by-case basis.

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12TH ADAPTATION TO TECHNICAL PROGRESS OF CLASSIFICATION PACKAGING AND LABELLING OF DANGEROUS SUBSTANCES DIRECTIVE (91/325 EEC OJ 8/7/91 L180/1) INCLUDES:

"DANGEROUS FOR THE ENVIRONMENT"
(Aquatic environment)

and corresponding:

Risk (R) Phrases
Safety (S) Phrases

NOTE:
Implementation date 1 July 1992 for substances. Implementation rules for preparations yet to be discussed.

ACS 2

"DANGEROUS FOR THE ENVIRONMENT" CLASSIFICATION CRITERIA (simplified version)

1 Classify all substances which are toxic to fish, daphnia, algae at less than 1 mg/l

2 Classify all substances which are toxic between 1 mg and 10 mg/l either:

(a) if they are not readily degradable, or

(b) if they are readily degradable but are likely to bio-accumulate (Log $P_{O/W}$ >3)

3 Classify all substances which are toxic between 10 mg/l and 100 mg/l and are not readily degradable unless can demonstrate no potential for danger to the environment

4 Classify all substances which are not readily degradable and which are likely to bioaccumulate (Log $P_{O/W}$ >3)

5 Classify substances not covered by 1-4 for which there is evidence that they may cause environmental problems.

ACS 13

"DANGEROUS FOR THE ENVIRONMENT"

RISK PHRASES
AQUATIC ENVIRONMENT

R50: Very toxic to aquatic organisms

R51: Toxic to aquatic organisms

R52: Harmful to aquatic organisms

R53: May cause long-term adverse effects in the aquatic environment

Note:

1 R50 and R53 may be used alone

2 R51 and R52 may only be used in combination with R53

3 R50 (with or without R53) and R51 plus R53 will attract the indication of danger and a symbol under the 7th amendment

"DANGEROUS FOR THE ENVIRONMENT"

"DANGEROUS FOR THE ENVIRONMENT"
RISK PHRASES
NON-AQUATIC ENVIRONMENT

R54: Toxic to flora

R55: Toxic to fauna

R56: Toxic to soil organisms

R57: Toxic to bees

R58: May cause long-term effects in the environment

R59: Dangerous for the ozone layer

Note:

Criteria for R54-59 have not, as yet, been defined

"DANGEROUS FOR THE ENVIRONMENT" CLASSIFICATION

1 Arbitrary hazard identification

2 Not a risk or hazard assessment

3 Likely to classify 40-50% substances (20-25% with symbol and indication of danger)

4 Likely problems for preparations (criteria mix toxicity and fate data)

DYESTUFFS MUST NECESSARILY BE HIGHLY STABLE IN USE. HENCE THEY WILL NOT BE "READILY DEGRADABLE" WITHIN THE MEANING OF THE EEC CLASSIFICATION CRITERIA.

THEREFORE, ALL DYES WHICH SHOW TOXICITY BELOW 100 MG/L WILL BE CLASSIFIED.

CLASSIFICATION CRITERIA (12th ADAPTATION)

ALGAL DATA

"Where it can be demonstrated in the case of highly coloured substances that algal growth is inhibited solely as a result of light reduction, then the 72 hr IC_{50} for algae should not be used as a basis for classification"

ALGAL DATA - DYESTUFFS

For classification purposes it is assumed that an algal toxicity in the range 10-100 mg/L is due to light reduction and classification is not considered necessary.

For dyes with an algal toxicity below 10 mg/L, a case-by-case assessment is suggested.

ETAD E3020
DATA SUMMARY : ACID DYES

TEST ORGANISM	END POINT	NO. OF RESULTS	TOXICITY mg/l			
			<1	1-10	10-100	>100
Zebra fish	96 hr LC_{50}	11	0	2	3	6
Daphnia magna	48 hr EC_{50}	9	0	0	6	3
Alga	72 hr EC_{50}	9	2	3	3	1
Bacteria	IC_{50}	11	0	0	0	11

PROBABLE CLASSIFICATION

			Classification basis
R50 + R53	:	2	(alga)
R51 + R53	:	3	(2 fish + alga: 1 alga)
R52 + R53	:	3	(3 fish or daphnia)
R53	:	1?	(sparingly soluble - more data required)
Not classified	:	2	

ETAD E3020

DATA SUMMARY : HYDROLYSED REACTIVE DYES

TEST ORGANISM	END POINT	NO. OF RESULTS	TOXICITY mg/l			
			<1	1-10	10-100	>100
Zebra fish	96 hr LC_{50}	8	0	0	0	8
Daphnia magna	48 hr EC_{50}	8	0	0	0	8
Alga	72 hr EC_{50}	8	0	0	7*	1
Bacteria	IC_{50}	8	0	0	0	8

Alga results are >10 mg/l

PROBABLE CLASSIFICATION

		Classification basis
R50 + R53	:	0
R51 + R53	:	0
R52 + R53	:	0
R53	:	0
Not classified	:	8
		8

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ETAD E3020
DATA SUMMARY : DIRECT DYES

TEST ORGANISM	END POINT	NO. OF RESULTS	TOXICITY mg/l			
			<1	1-10	10-100	>100
Zebra fish	96 hr LC_{50}	7	0	0	0	7
Daphnia magna	48 hr EC_{50}	7	0	0	0	7
Alga	72 hr EC_{50}	7	0	3	2	2
Bacteria	IC_{50}	7	0	0	0	7

PROBABLE CLASSIFICATION

		Classification basis
R50 + R53	:	0
R51 + R53	:	3 (alga)
R52 + R53	:	0
R53	:	0
Not classified	:	4
		7

ETAD E3020
DATA SUMMARY : BASIC DYES

TEST ORGANISM	END POINT	NO. OF RESULTS	TOXICITY mg/l			
			<1	1-10	10-100	>100
Zebra fish	96 hr LC_{50}	6	0	3	3	0
Daphnia magna	48 hr EC_{50}	6	5	0	1	0
Alga	72 hr EC_{50}	6	2	4	0	0
Bacteria	IC_{50}	6	0	3	2	1

PROBABLE CLASSIFICATION

			Classification basis
R50 + R53	:	5	(5 Daphnia - 2 daphnia & alga)
R51 + R53	:	1	(fish & alga)
R52 + R53	:	0	
R53	:	0	
Not classified	:	0	
		6	

ACS 26

ETAD E3020
DATA SUMMARY : DISPERSE DYES

TEST ORGANISM	END POINT	NO. OF RESULTS	TOXICITY mg/l			
			<1	1-10	10-100	>100
Zebra fish	96 hr LC_{50}	11	0	0	2	9
Daphnia magna	48 hr EC_{50}	10	0	2	2	6
Alga	72 hr EC_{50}	8	3	3	2 (3)*	0
Bacteria	IC_{50}	11	0	0	0	11

#3 algal results are >10 mg/l

PROBABLE CLASSIFICATION

			Classification basis
R50 + R53	:	3	(alga)
R51 + R53	:	4	(2 daphnia + alga : 2 alga)
R52 + R53	:	2	(1 fish; 1 daphnia)
R53	:	2	(probable high Log $P_{O/W}$)
Not classified	:	0	
		11	

Note: The water insolubility, probable high Log $P_{O/W}$ and low biodegradability of all disperse dyes likely to result in at least R53.

ACS 25

ETAD E3020
DATA SUMMARY : MORDANT DYES

TEST ORGANISM	END POINT	NO. OF RESULTS	TOXICITY mg/l			
			<1	1-10	10-100	>100
Zebra fish	96 hr LC_{50}	3	0	0	0	3
Daphnia magna	48 hr EC_{50}	1	0	0	0	1
Alga	72 hr EC_{50}	3	3	0	0	0
Bacteria	IC_{50}	3	0	0	0	3

PROBABLE CLASSIFICATION

		Classification basis
R50 + R53	:	3 (alga)
R51 + R53	:	0
R52 + R53	:	0
R53	:	0
Not classified	:	0
		3

ACS 26

ETAD E3020

DATA SUMMARY : SULPHUR DYE (LEUCO FORM)

TEST ORGANISM	END POINT	NO. OF RESULTS	TOXICITY mg/l			
			<1	1-10	10-100	>100
Zebra fish	96 hr LC_{50}	1	0	0	0	1
Daphnia magna	48 hr EC_{50}	1	0	0	0	1
Alga	72 hr EC_{50}	1	1	0	0	0
Bacteria	IC_{50}	1	0	0	0	1

PROBABLE CLASSIFICATION

		Classification basis
R50 + R53	:	1 (alga)
R51 + R53	:	0
R52 + R53	:	0
R53	:	0
Not classified	:	0
		1

CLASSIFICATION SUMMARY

FORTY-SEVEN DYES

R50 + R53	: 14	(9 on basis algal data only)
R51 + R53	: 11	(6 on basis algal data only)
R52 + R53	: 5	
R53	: 2	
Total classified	: 32	
Not classified	: 15	

Classified R50/R51 + R53 (symbol & indication of danger) : 25

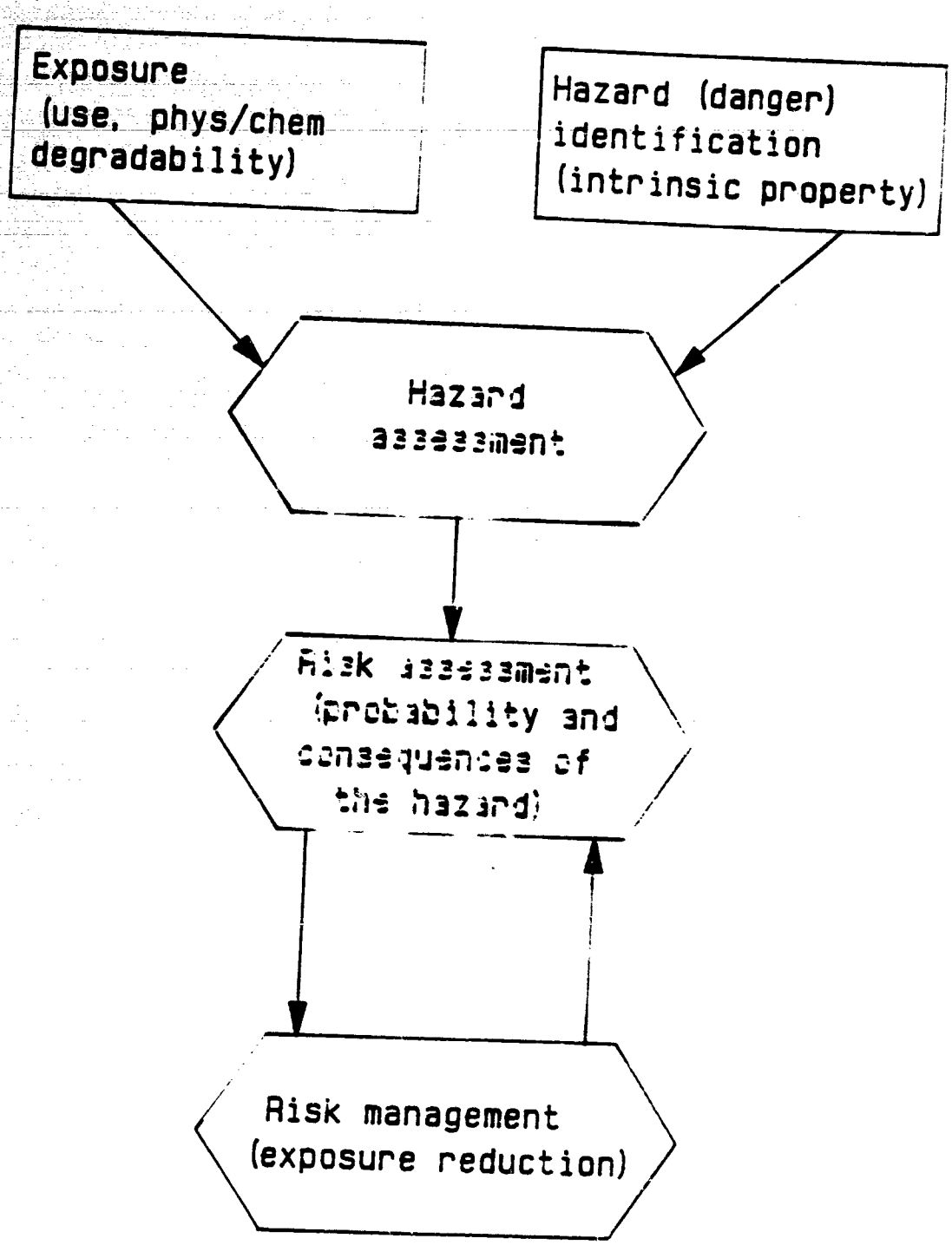
ACS 23

"6TH AMENDMENT" DIRECTIVE (79/831/EEC)

Article 3.2

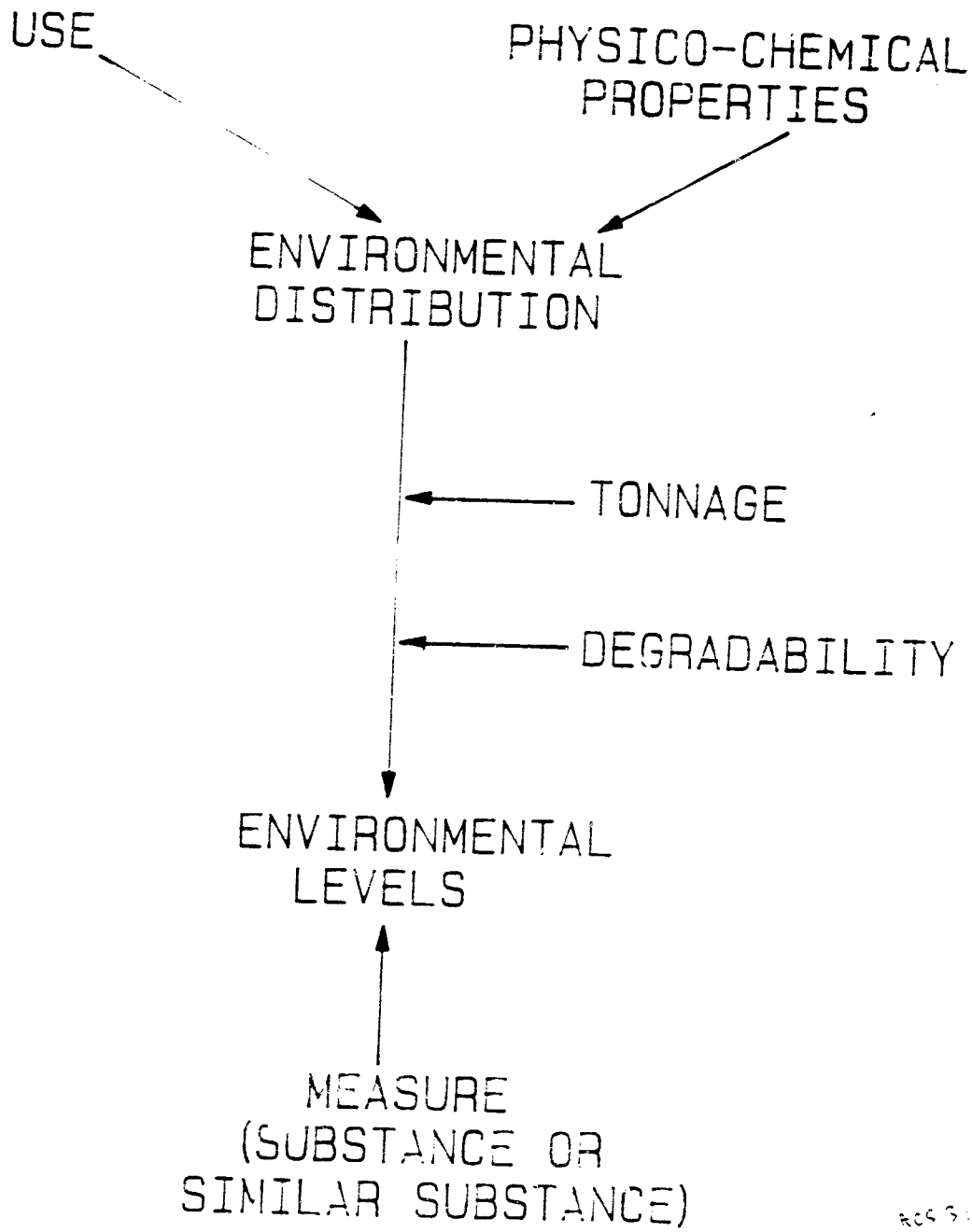
The real or potential environmental hazard shall be assessed according to the characteristics set out in Annexes VII and VIII, on the basis of any existing internationally recognized parameters.

Commission objective to agree a community-wide scheme (ISPRA workshop)


Exposure
(use, phys/chem
degradability)
Hazard (danger)
identification
(intrinsic property)
Hazard
assessment
Risk assessment
(probability and
consequences of
the hazard)
Risk management
(exposure reduction)

ACS 30

ENVIRONMENTAL LEVELS



PREDICTION OF ENVIRONMENTALLY "SAFE" LEVELS (AQUATIC ECO-SYSTEMS)

PROBLEM

Many possible species in the natural environment all at different life-stages (egg, larva, adult).

Protection required against short-term acute effects and for continual exposure against chronic sub-lethal effects. How provide necessary assurance of protection with a limited data base?

ASSESSMENT FACTORS

PRAGMATIC SOLUTION:

Apply empirical assessment factors to the data.

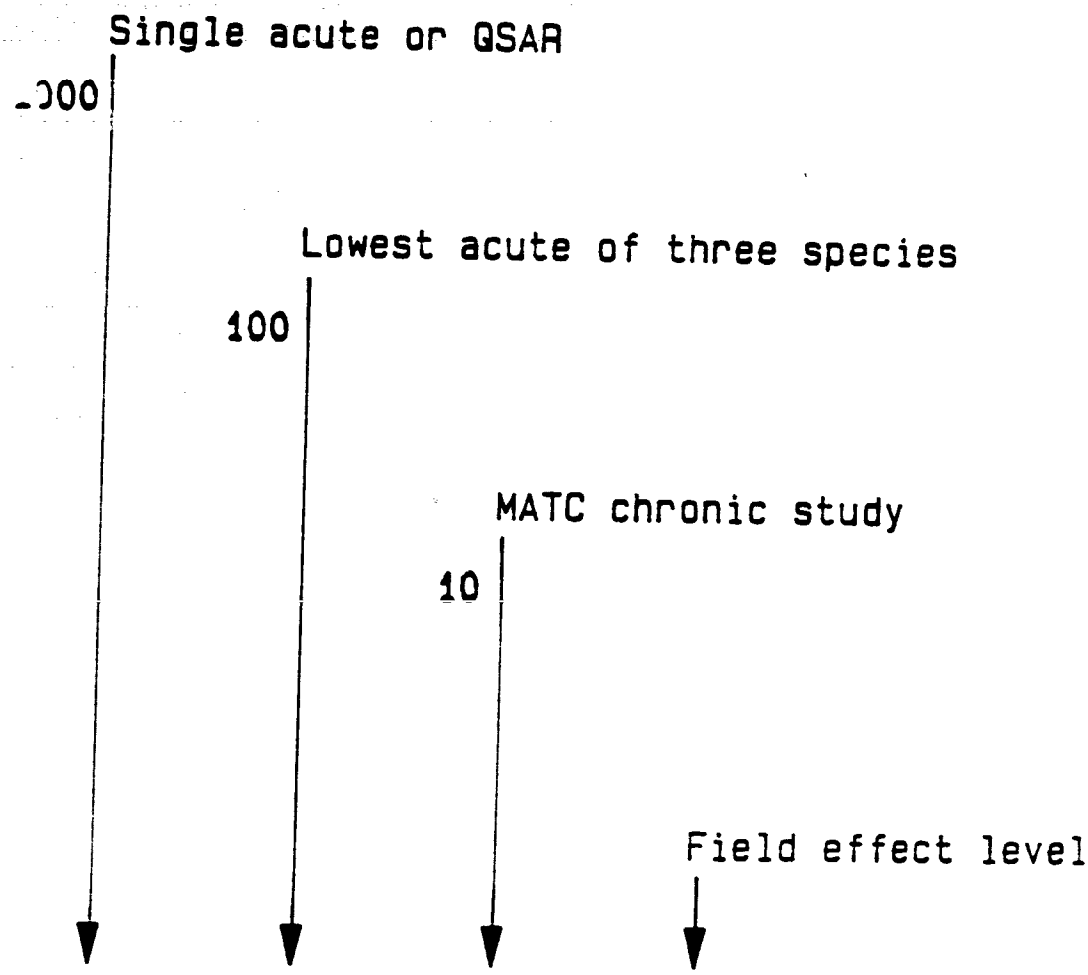
Large factors for a small data base of acute data.

Medium factors for a large data base of acute data.

Small factors for a data base of chronic data.

Factors of one (or less) for field data (healthy natural eco-systems in the presence of the substance in question).

US EPA ASSESSMENT FACTORS (AFTER US EPA 1984)



ACS 3-

ETAD PROJECT E3020
RESULTS AND ASSESSMENT FACTORS

	Numbers of dyes toxic in stated range (ug/l)					
	<10	$10-10^2$	10^2-10^3	10^3-10^4	10^4-10^5	$>10^5$
Fish	0	0	0	5	8	34
Daphnia	0	2	3	2	8	26
Alga	1	2	7	12	6	4
Environmentally "safe" (ug/l) (assessment factor 100)	<0.1	$0.1-1$	$1-10$	$10-10^2$	10^2-10^3	$>10^3$

Range where analysis may be/is possible

Ness

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CALCULATED LEVELS OF INDIVIDUAL DYESTUFFS

Average level (small river) : 1 ug/l
(Brown, 1987)

Average levels (small rivers) : 2.5-150 ug/l
(Hobbs, 1988)

Worst case (v. small rivers) : 2 mg/l
(Hobbs, 1988)

ASSESSMENT FACTORS:

Appropriate for average concentrations in a major river or the sea.

May be inappropriate for peak concentrations calculated on the basis of intermittent discharges to small streams.

Laboratory ecotoxicity tests make every effort to make a substance "Bioavailable".

In the real environment a number of factors usually reduce bioavailability.

Calculated or measured environmental levels tend to represent total and often "worst case" scenario.

RISK MANAGEMENT (EXPOSURE REDUCTION) POSSIBILITIES

- Labelling
- Packaging/transport
- Customer advice (data sheets etc)
- Formulation change
- Limit use applications
- Limit customers
- Treatment (of wastes)
- Re-cycle substance

etc

- Withdraw/replace product

CONCLUSIONS

ANALYSIS

Need to monitor actual levels of dyes in small rivers receiving dye-house effluents

BIOLOGICAL MONITORING

Need to monitor biological health of rivers receiving dye-house effluents

REDUCE EXPOSURE

Textile mills need to consider all possible ways of minimising the discharge of concentrated coloured effluents

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